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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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P.O. BOX 34385				
WASHINGTON, DC 20043-9998				
EXAMINER				
BELOUSOV, ALEXANDER				
ART UNIT		PAPER NUMBER		
2894				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/599,036

Applicant(s)

AMOH ET AL.

Examiner

ALEXANDER BELOUSOV

Art Unit

2894

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 May 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 3, 4 and 6-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3, 4, 6-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/22)
- Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. In view of the Appeal brief filed on 05/07/2010, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/K. D. N./

Supervisory Patent Examiner, Art Unit 2894.

Examiner's Note: All the prior art used in the current rejection of most of the claims has already been used in the various previous rejections of the claims. This previously cited prior art is used in the same way as it was used in the previous rejections. The only thing that is new about the current rejection of most claims is the way the previously cited prior art is combined.

The exception to this is *claim 3*. For this claim the Examiner provided additional explanation from the Ishii reference, since the Applicant argued in his Appeal Brief (Page 8) that

Ishii reference does not teach the limitations of claim 3. The additional explanation begins with words “**as far as claim limitations**”. Everything else in this rejection is old material.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1, 3, 4 & 7-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over (JP-2002-127948) by Ishii et al (“Ishii”; please use US-2005/0167679 as the *official translation* of the Japanese reference; *all* the references in the rejection are to the *US version* of the reference) in view of Silicon Processing for VLSI Era Volume 1 by Wolf et al (“Wolf”; previously submitted by the Examiner) and further in view of (US-6689498) by Shinosawa et al (“Shinosawa”).

Regarding claim 1, Ishii discloses in FIG. 1 and related text, e.g., a semiconductor light-emitting element mounting member (3) comprising:

a substrate (4); and

at least one metal film (6, 7a & 7b) formed on a surface of said substrate (it is above substrate’s surface; hence, “on”), formed from Ag, Al, or an alloy containing said metals (paragraph 60: “mainly of Au”; hence, an alloy of mostly Au), and functioning as at least one of an electrode layer (paragraph 6) for mounting at least one semiconductor light-emitting element (2; it is above it; hence, “for mounting”, etc) or a reflective layer for reflecting light from a semiconductor light-emitting element wherein:

the thickness of the at least one metal film is 0.5-3 micron (paragraph 64 specifies the range of layer thicknesses for layers 6, 7a & 7b; it meets the requirement of “0.5-3” by an overlapping range);

an adhesion layer (5b) and a barrier layer (5a) are formed, in sequence, on said substrate, with said metal film being formed on said barrier layer;

the thickness of the adhesion layer is 0.01-1.00 um (paragraph 64); and

the thickness of the barrier layer is 0.01-1.50 um (paragraph 64).

Ishii does not **explicitly state** “crystal grains of said metal or alloy forming said at least one metal film have a particle diameter along a surface plane of said at least one metal film is no more than 0.5 micron; a surface of said metal film has a center-line average roughness Ra of no more than 0.1 micron”.

In other words, Ishii discloses everything except for certain specific material properties of “metal film”. However, Wolf and Shinosawa teach such material properties.

Wolf discloses, e.g., crystal grains of said metal or alloy forming said at least one metal film have a particle diameter along a surface plane of said at least one metal film is no more than 0.5 micron ; a surface of said metal film has a center-line average roughness Ra of no more than 0.1 micron (pages 106-107 describe the vapor deposition process; bottom of page 106: smaller grains are result of lower substrate temperature; top of page 107: smaller grains are result of higher deposition rates; these are the two methods stated by applicant in his disclosure for achieving his particle diameter and roughness specs; hence, these results are **inherent** in the application of Wolf’s teaching by applicant’s own disclosure).

NOTE: the Applicant states one more factor which **may** affect particle diameter and roughness specs: roughness of the substrate; however, Applicant discloses that this is not a strict requirement (page 16: “**may** not be possible”). However, in order to eliminate any doubt, an explicit teaching for the roughness of the substrate is provided below.

Shinosawa discloses in FIG. 3 and related text, **e.g.**, a surface roughness of the substrate is 0.05 .mu.m or less (see column 7, lines 30-40; please note that the Applicant discloses a surface roughness of the substrate that is 0.08 .mu.m or less for the substrate that meets the claim limitations (page 37, top table, “Seventh example”).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Ishii with “crystal grains of said metal or alloy forming said at least one metal film have a particle diameter along a surface plane of said at least one metal film is no more than 0.5 micron; a surface of said metal film has a center-line average roughness Ra of no more than 0.1 micron”, in order to optimize the manufacturing process to further increase the reflection factor of the thin film (see Kitano, paragraph 8: raising reflection factor is a stated goal of the invention; also see Shinosawa, column 1, lines 50-65 and column 5, lines 19-26; “mirror finish” is one of Shinosawa's goals) and in order to improve metal film deposition accuracy (see Shinosawa, column 7, lines 30-40), respectively.

Please note that applying a known technique (Wolf and Shinosawa's teachings for reducing the grain size and surface roughness of a thin film) to a known device ready for improvement (device of Ishii) to yield predictable results (grain size and surface roughness of thin film are reduced) is considered to be obvious (KSR International Co. v. Teleflex Inc., 550 U.S., 82 USPQ2d 1385).

Regarding claim 3, the combined device of Ishii, Wolf and Shinosawa discloses in FIG. 1 of Ishii and related text, e.g., said metal film is formed as an alloy of at least one of Ag and Al and other metal, a proportional content of said other metal being 0.001-10 percent by weight (paragraph 64 specifies the range of layer thicknesses for layers 6, 7a & 7b; the ranges of the layer thicknesses are sufficiently broad to allow it to meet the requirement of "said other metal being 0.001-10 percent by weight" by an overlapping range; for example, by making 7b out of Cr, and making it sufficiently thin when compared to layer 6; also, layer 6 is "mainly Au", which means that it is an alloy; also alloying inherently occurs when different metal layers are stacked on each other: due to heating and compression, there is an intermingling at the boundaries between the layers; **as far as claim limitations** "a proportional content of said other metal being *0.001-10 percent by weight*" specifically, the layer 6 *for the same embodiment* is sometimes described as "mainly Au" (paragraph 64) and sometimes described as "a gold (Au) layer" (paragraph 51), or "Au layer" (paragraph 63); the only logical conclusion that a reasonable reader of the reference can make is that the content of any additional material in the layer is so low that the layer can be legitimately described as "a gold (Au) layer"; hence, less than 10% by weight, as the Applicant's claim limitations require (and as Applicant argues on page 8 of his Appeal Brief), while simultaneously being significant enough to worth mentioning; hence, more than 0.001% as claim limitations require; at the very least, it is safe to say that Ishii reference teaches these claim limitations by an *overlapping range*).

Regarding claim 4, the combined device of Ishii, Wolf and Shinosawa discloses in FIG. 1 of Ishii and related text, e.g., wherein said other metal is at least one type of metal selected from a group consisting of Cu, Mg, Si, Mn, Ti, and Cr (see paragraph 59; the layer 7b can be Cr).

Regarding claims 7 & 8, the combined device of Ishii, Wolf and Shinosawa discloses in FIG. 1 of Ishii and related text, e.g., a thermal expansion coefficient of said substrate (4) is $1.\text{times}10.\text{sup}.-6/\text{K}$ - $10.\text{times}10.\text{sup}.-6/\text{K}$ and a thermal conductivity of said substrate is at least 80 W/mK (paragraph 4; "AlN"; by Applicant's admission on page 12, lines 11-12, "AlN" meets the above claim limitations).

Regarding claim 9, the combined device of Ishii, Wolf and Shinosawa discloses in FIG. 1 of Ishii and related text, e.g., wherein said semiconductor light-emitting element mounting member is a flat submount (it has a flat surface).

Regarding claim 10, the combined device of Ishii, Wolf and Shinosawa discloses in FIG. 1 of Ishii and related text, e.g., a semiconductor light-emitting element (2) mounted in said semiconductor light-emitting element mounting member.

Regarding claim 11, the combined device of Ishii, Wolf and Shinosawa discloses in FIG. 1 of Ishii and related text substantially the entire claimed structure, as recited in claims 1 & 10, but does not explicitly state the output of said semiconductor light-emitting element is at least 1 W.

It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the device of Ishii, Wolf and Shinosawa with the output of said semiconductor light-emitting element is at least 1 W, in order to be able to use the element mounting member in an application requiring high-power light-emitting elements.

Regarding claims 12 & 13, the combined device of Ishii, Wolf and Shinosawa discloses in FIG. 1 of Ishii and related text, e.g., said substrate is an insulative ceramic that is selected from a group consisting of AlN, Al_2O_3 , SiC, Si_3N_4 , BeO, BN, and insulative Si (paragraph 4).

3. **Claim(s) 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over (JP-2002-127948) by Ishii et al (“Ishii”; please use US-2005/0167679 as the *official translation* of the Japanese reference; *all* the references in the rejection are to the *US version* of the reference) in view of Silicon Processing for VLSI Era Volume 1 by Wolf et al (“Wolf”; previously submitted by the Examiner) and (US-6689498) by Shinosawa et al (“Shinosawa”) as applied to claim(s) 1 above, and further in view of (US-2002/0171087) by Krames et al (“Krames”).

Regarding claim 6, the combined device of Ishii, Wolf and Shinosawa discloses in FIG. 1 of Ishii and related text substantially the entire claimed structure, as recited in claim 1, except wherein said metal film is formed from Al alone or from an alloy of Al and other metal.

Krames discloses in FIG. 10(b) and related text, e.g., wherein said metal film is formed from Al alone or from an alloy of Al and other metal (paragraph 52, “Metallization 52, e.g. Ag or Al”; also, see paragraph 61, “Ag and Al are suitable choices for the submount top surface metallization”)

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Ishii, Wolf and Shinosawa with wherein said metal film is formed from Al alone or from an alloy of Al and other metal, in order to improve the marketability of the device in a price sensitive segments of the market by reducing the cost of materials (as is known to everyone, Aluminum is quite a bit cheaper than Gold).

Response to Arguments

1. Applicant’s arguments with respect to above claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

1. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Belousov whose telephone number is 571-270-3209. The examiner can normally be reached on Monday - Thursday 7:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kimberly Nguyen can be reached on 571-272-2402. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Alexander Belousov/
Examiner, Art Unit 2894
08/05/2010

/Kimberly D Nguyen/
Supervisory Patent Examiner, Art Unit 2894